No. 200200206

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Colorado Wheat Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HERETO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR USING IT IN CING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY TION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A RTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'Above'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this twentieth day of September, in the year two thousand two.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions* — Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
Colorado wheat Research Foundation

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
CO980894

3. VARIETY NAME
Above

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Dept. of Soil and Crop Sciences
Colorado State University
Fort Collins, CO 80523

5. TELEPHONE *(include area code)*
970-491-6483

FOR OFFICIAL USE ONLY

PVPO NUMBER
200200206

6. FAX *(include area code)*
970-491-0564

FILING DATE
July 15, 2002

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
Association

8. IF INCORPORATED, GIVE STATE OF INCORPORATION

9. DATE OF INCORPORATION

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*
Scott D. Haley
Dept. Soil and Crop Sciences
Colorado State University
Fort Collins, CO 80523

FEES RECEIVED

FILING AND EXAMINATION FEES:
$ 2705.00
DATE 7/15/2002

CERTIFICATION FEE:
$ 300
DATE 9/13/02

11. TELEPHONE *(Include area code)*
970-491-6483

12. FAX *(Include area code)*
970-491-0564

13. E-MAIL
shaley@colostate.edu

14. CROP KIND *(Common Name)*
wheat, common

15. GENUS AND SPECIES NAME OF CROP
Triticum aestivum L.

16. FAMILY NAME *(Botanical)*
Gramineae

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☒ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

- a. ☒ Exhibit A. Origin and Breeding History of the Variety
- b. ☒ Exhibit B. Statement of Distinctness
- c. ☒ Exhibit C. Objective Description of Variety
- d. ☒ Exhibit D. Additional Description of the Variety *(Optional)*
- e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership
- f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
- g. ☒ Filing and Examination Fee ($2,705), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*
☒ YES *(If "yes", answer items 20 and 21 below)* ☐ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☒ YES ☐ NO
IF YES, WHICH CLASSES? ☒ FOUNDATION ☒ REGISTERED ☒ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☒ YES ☐ NO
IF YES, SPECIFY THE NUMBER 1,2,3, *etc.* [1] FOUNDATION [1] REGISTERED [1] CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☒ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☒ YES ☐ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER		SIGNATURE OF OWNER	
NAME *(Please print or type)* Scott Haley		NAME *(Please print or type)*	
CAPACITY OR TITLE Assoc. Professor	DATE 7/16/02	CAPACITY OR TITLE	DATE

20020206

INSTRUCTIONS

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $2,705 ($320 filing fee and $2,385 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $320 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291
Homepage: http://www.ams.usda.gov/science/pvpo/pvp.htm

ITEM

18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

23. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

21. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

22. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

August 27, 2001 Seed sold in Colorado, USA

23. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

USA, filed 3/25/1994, assigned 1/15/2002, Patent # 6,339,184

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705. Telephone: (301) 504-8089. http://www.ams.usda.gov/lsg/seed/ls-sd.htm

S&T-470 (04-01) designed by the Plant Variety Protection Office with WordPerfect 6.0a. Replaces STD-470 (02-99) which is obsolete.

PVP Application
Above Hard Red Winter Wheat
Exhibit A – Origin and Breeding History of the Variety

Pedigree – Above was selected from the cross "TAM 110*4/FS2".

Experimental designation – Above was assigned the experimental identification number CO980894 in 1998.

Parents – The parents of Above are:

1) TAM 110 – a wheat cultivar developed and released by the Texas A&M Agricultural Experiment Station in 1997.

2) FS2 – a proprietary wheat germplasm line developed by BASF Corporation (formerly American Cyanamid) through induced mutagenesis, with sodium azide and the French wheat cultivar 'Fidel', to obtain tolerance to the imidazolinone class of herbicides. The development of FS2 was described in the following scientific journal article:

Newhouse, K.E., W.A. Smith, M.A. Starrett, T.J. Schaefer, and B.K. Singh. 1992. Tolerance to imidazolinone herbicides in wheat. Plant Physiol. 100:882-886.

Following are the breeding procedures used in the development of Above:

1993 – In October 1993, seed of the two parents (TAM 110 and FS2) was germinated in petri dishes and placed in a lighted cold room for an eight-week vernalization period at 4 °C. Following vernalization, seedlings were hand-transplanted into the greenhouse at Bushland, TX, in December 1993.

1994 – F1 seed obtained by crossing TAM 110 (as female) with FS2 (as male) was harvested from the greenhouse in March 1994. In June 1994, F1 seed was germinated and vernalized as described above. Following vernalization, seedlings were hand-transplanted into the greenhouse in August 1994. BC1F1 seed obtained by crossing TAM 110 (as female) with the F1 (as male) was harvested from the greenhouse in November 1994. BC1F1 seed was immediately germinated and vernalized as described above.

1995 – BC1F1 seedlings were hand-transplanted into the greenhouse in January 1995. The BC1F1 population, segregating for the gene conferring tolerance to imazamox herbicide (BEYOND™, BASF Corporation), was treated with imazamox herbicide at the 4 oz $acre^{-1}$ rate in the greenhouse at Bushland, TX, to identify imazamox-tolerant plants. BC2F1 seed obtained by crossing TAM 110 (as female) with imazamox-tolerant BC1F1 plants (as male) was harvested from the greenhouse in April 1995. In June 1995, BC2F1 seed was germinated and vernalized as previously described. Following vernalization, seedlings were hand-transplanted into the greenhouse in August 1995. The BC2F1 population was treated with imazamox herbicide as previously described. BC3F1 seed obtained by crossing TAM 110 (as female) with imazamox-tolerant BC2F1 plants (as male) was harvested from the greenhouse in December 1995. BC3F1 seed was immediately germinated and vernalized as previously described.

1996 – In January 1996, BC3F1 seeds were germinated, vernalized, and hand-transplanted into the greenhouse at Bushland, TX. Imazamox-tolerant BC3F1 plants, identified by application of imazamox as previously described, were increased to the BC3F2

generation by self-pollination. The BC3F2 population was obtained by bulking seed harvested from BC3F1 plants in May 1996 at Bushland, TX.

1997 – In March 1997, seeds of the BC3F2 population were germinated on moistened filter paper in petri dishes in the presence of a 50 ppm solution of imazamox herbicide. Seedlings surviving the imazamox treatment were transferred to clean petri dishes with filter paper and vernalized as previously described. Following vernalization, seedlings were hand-transplanted to a summer field nursery in the San Luis Valley, CO, in May 1997. At maturity, segregation in the BC3F2 population was observed for glume color and plant height. Single-plant selections were made in early September 1997. Seed of these single plant selections was planted in late September 1997 in unreplicated single rows at Akron and Fort Collins, CO.

1998 – BC3F2:3 lines derived from the BC3F2 population were grown in single rows at Akron and Fort Collins, CO. A field rate of imazamox herbicide (8 oz $acre^{-1}$) was applied in early April 1998 at both locations. At maturity, segregation among and within the lines was noted for tolerance to imazamox, glume color, and plant height. Line selections were made in July 1998 based on overall agronomic adaptation (including heading date and plant height) and uniformity of tolerance to imazamox herbicide. One BC3F2-derived line selection designated as CO980894 was planted in September 1998 with other selections in single replication trials at Walsh, Burlington, Julesburg, Akron, and Fort Collins, CO. Concurrent with these unreplicated trials, bulk seed increases were planted under irrigation in 30-foot plots in September 1998 at Fort Collins, CO.

1999 – CO980894 was grown in single replication trials at five locations in Colorado along with other imazamox-tolerant lines. Variation among and within lines was noted for grain yield, test weight, plant height, heading date, straw strength, and overall agronomic adaptation. Grain harvested from the trials in July 1999 was used for milling and baking quality evaluations in August 1999, including NIR protein content, NIR grain hardness, Mixograph water absorption, Mixograph mixing time, and Mixograph mixing tolerance. Based on these traits, and uniformity of CO980894 in the bulk seed increases (treated with imazamox at 8 oz $acre^{-1}$ in April 1999), CO980894 was selected (along with five other imazamox-tolerant lines) for advancement to the Colorado Uniform Variety Performance Trial (UVPT) planted in September 1999 at 10 nonirrigated trial locations in eastern CO. For generation of Breeder seed, 500 single heads were harvested at random in July 1999 from the bulk seed increase plot for a headrow Breeder seed increase planted in November 1999 in Yuma, AZ, and Brawley, CA. The remnant seed from the bulk seed increases was used as the seed source for the UVPT planted in September 1999.

2000 – CO980894 was grown with five other imazamox-tolerant lines in replicated trials at 10 nonirrigated locations in eastern CO in 2000. Variation among the lines was noted for grain yield, test weight, plant height, heading date, straw strength, and overall agronomic adaptation. Grain harvested from the trials in July 2000 was used for milling and baking quality evaluations in August 2000, including NIR protein content, NIR grain hardness, Mixograph water absorption, Mixograph mixing time, and Mixograph mixing tolerance. Based on these traits, and uniformity of CO980894 in the Breeder seed headrow increases in Yuma, AZ, and Brawley, CA (treated with imazamox at 8 oz $acre^{-1}$ in January 2000), line CO980894 was selected for further evaluation in the Colorado UVPT planted in September 2000 at 10 nonirrigated trial locations in eastern CO. A 40-acre Foundation

seed increase was planted in November 2000 near Yuma, AZ, from the bulk-harvested Breeder seed increase grown in 2000.

2001 – CO980894 (a BC3F2:6 line) was grown in replicated trials at 10 nonirrigated locations in Colorado in 2001. The 40-acre Foundation Seed increase grown near Yuma, AZ, in 2001 was treated with imazamox (at 4 oz $acre^{-1}$ in January 2001) at the seedling stage. Based on yield and test weight performance in the 2000 and 2001 Colorado UVPT, CO980894 was assigned the name Above and released for sale to seed producers in August 2001.

Above is uniform. Variants are limited to slightly taller plants that occur at a frequency of less than 1 in 1,000 plants and plants with brown glumes that occur at a frequency of less than 1 in 1,000 plants. The variants in Above are tolerant to imazamox herbicide. The variants in Above as well as the typical plants in Above are commercially acceptable.

Above is stable. When sexually reproduced, Above remains unchanged in its essential and distinctive characteristics. Above was observed to be uniform and stable during the last four generations (preliminary yield trials in 1998, bulk seed increase in 1999, Breeder seed increase in 2000, Foundation seed increase in 2001).

PVP Application
Above Hard Red Winter Wheat
Exhibit B – Statement of Distinctness

Above is most similar to the hard red winter wheat cultivar TAM 110 but differs in the following characteristics:

1) Above has white glume color while TAM 110 has brown glume color.

2) Above is homozygous and homogeneous for a gene that confers tolerance to imazamox herbicide (Beyond™, BASF Corporation) at the labeled 4-6 oz acre^{-1} application rate. TAM 110 is homozygous and homogeneous for the allele that confers sensitivity to imazamox herbicide application, which includes severe injury and death within three weeks following treatment at the labeled 4-6 oz acre^{-1} application rate.

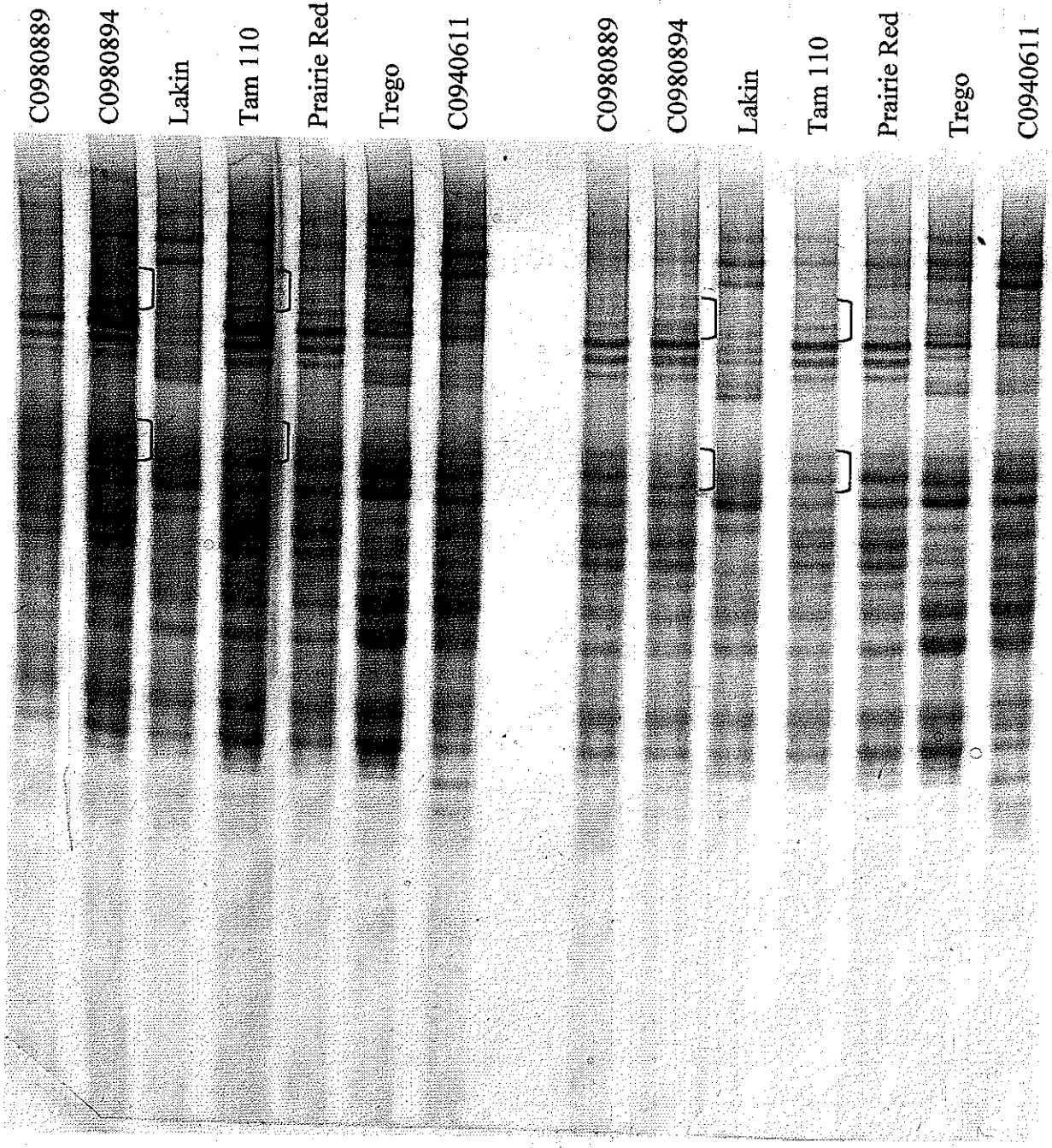
3) Above and TAM 110 exhibit two clear differences in their seed storage protein banding pattern as revealed by sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) analysis (see **Photograph 1** attached).

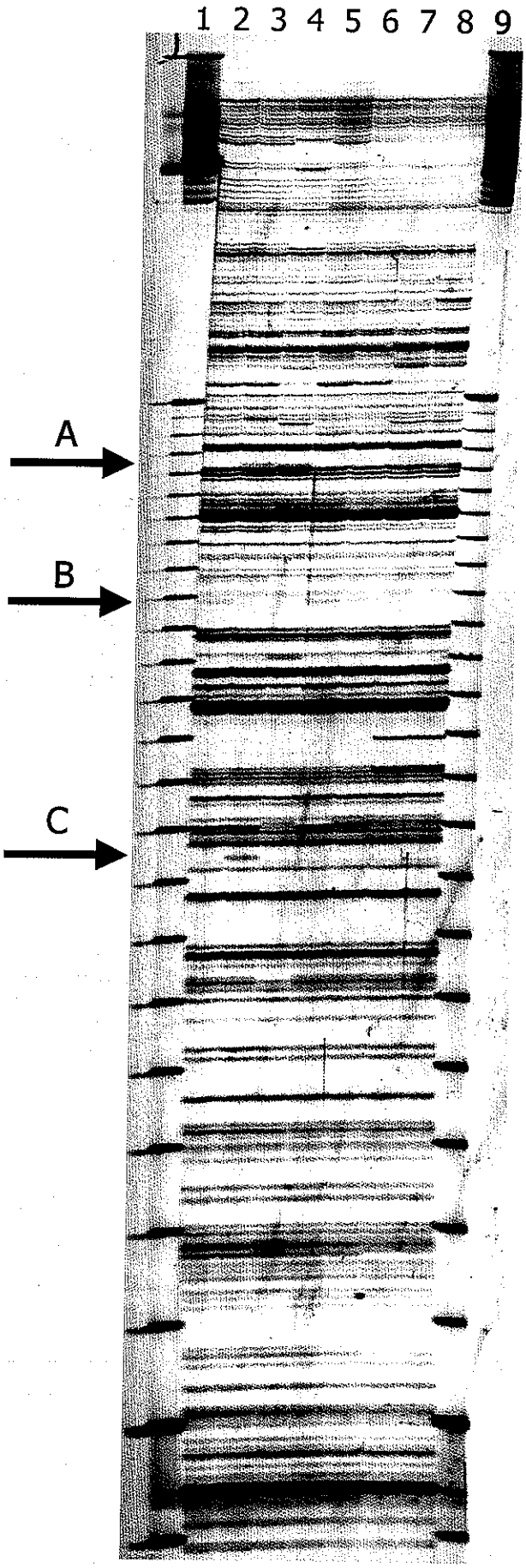
4) Above and TAM 110 show three clear differences in their DNA fingerprinting pattern as revealed by amplified fragment length polymorphism (AFLP) analysis using the AFLP primer E-ACC M-CTA (see **Photograph 2** attached).

Photograph 1

CSU Wheat
SDSU Seed Testing Lab
Gel #01-33A
03/29/01

Band differences between **Above** (CO980894) and **TAM 110** are highlighted by brackets.





Photograph 2

Amplified PCR products with AFLP primers E-ACC M-CTA, using Invitrogen Life Technologies AFLP Analysis System 1 Kit (Cat.#10544-013).

1 = Invitrogen Life Technologies 10 bp DNA Ladder (Cat.#10821-015)
2 = CO980889
3 = CO980894 (ABOVE)
4 = Lakin
5 = TAM110
6 = Prairie Red
7 = Trego
8 = CO940611
9 = Invitrogen Life Technologies 10bp DNA Ladder (Cat.#10821-015)

Arrow A: 294 bp DNA band present in CO980894, absent in CO980889 and TAM110

Arrow B: 238 bp DNA band present in CO980889 and TAM110, absent in CO980894

Arrow C: 174 bp DNA band present in CO980894, absent in CO980889 and TAM110

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Form Approved – OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT C
(*Wheat*)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*Triticum* spp.)

NAME OF APPLICANT(S)
Colorado Wheat Research Foundation

ADDRESS (Street and No. or RD No., City, State, and Zip Code)
c/o Scott D. Haley
Dept. Soil and Crop Sciences
Colorado State University
Fort Collins, CO 80523

FOR OFFICIAL USE ONLY

PVPO NUMBER
20200206

VARIETY NAME
Above

TEMPORARY OR EXPERIMENTAL DESIGNATION
CO980894

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g. [0][9][9] or [0][9]) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used:
Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

[1] 1=Common 2=Durum 3=Club 4=Other (SPECIFY): _____

2. VERNALIZATION:

[2] 1=Spring 2=Winter 3=Other (SPECIFY): _____

3. COLEOPTILE ANTHOCYANIN:

[1] 1=Absent 2=Present

4. JUVENILE PLANT GROWTH:

[2] 1=Prostrate 2=Semi-erect 3=Erect

5. PLANT COLOR (boot stage):

[2] 1 = Yellow-Green 2 = Green 3 = Blue-Green

6. FLAG LEAF (boot stage):

[1] 1 = Erect 2 = Recurved [1] 1 = Not Twisted 2 = Twisted

7. EAR EMERGENCE:

[ ][ ] Number of Days Earlier Than _____ *

[0][1] Number of Days Later Than TAM 107 *

8. ANTHER COLOR:

[1] 1 = Yellow 2 = Purple

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9. PLANT HEIGHT (from soil to top of head, excluding awns):

[ ] cm Taller Than _____ *

[11] cm Shorter Than _____ *

* Relative to a PVPO-Approved Commercial Variety Grown in the Same Trial

10. STEM:

A. ANTHOCYANIN

[1] 1= Absent 2=Present

B. WAXY BLOOM

[2] 1=Absent 2=Present

C. HAIRINESS (last internode of rachis)

[2] 1=Absent 2=Present

D. INTERNODE (SPECIFY NUMBER)

[1] 1= Hollow 2=Semi-solid 3=Solid

E. PEDUNCLE

[2] 1=Absent 2=Present

[19] cm Length

. HEAD (at Maturity):

A. DENSITY

[2] 1=Lax 2=Middense 3= Dense

B. SHAPE

[1] 1 = Tapering 2= Strap 3 = Clavate 4 = Other (SPECIFY): _____

C. CURVATURE

[2] 1 = Erect 2 = Inclined 3 = Recurved

D. AWNEDNESS

[4] 1 = Awnless 2 = Apically Awnletted 3 = Awnletted 4 = Awned

GLUMES (at Maturity):

A. COLOR

[1] 1 = White 2 = Tan 3 = Other (SPECIFY) : _____

B. SHOULDER

[2] 1 = Wanting 2 = Oblique 3 = Rounded 4 = Square 5 = Elevated 6 = Apiculate

C. BEAK

[3] 1 = Obtuse 2 = Acute 3 =Acuminate

D. LENGTH

[2] 1 = Short (ca. 7mm) 2 = Medium (ca. 8mm) 3 = Long (ca. 9mm)

12. GLUMES (at Maturity) *Continued*:

E. WIDTH

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[2] 1 = Narrow (ca. 3mm) 2 = Medium (ca. 3.5mm) 3 = Wide (ca. 4mm)

13. SEED:

A. SHAPE

[1] 1 = Ovate 2 = Oval 3 = Elliptical

B. CHEEK

[1] 1=Rounded 2=Angular

C. BRUSH

[2] 1=Short 2=Medium 3=Long

[1] 1 = Not Collared 2 = Collared

D. CREASE

[2] 1 = Width 60% or less of Kernel
2 = Width 80% or less of Kernel
3 = Width Nearly as Wide as Kernel

[1] 1 = Depth 20% or less of Kernel
2 = Depth 35% or less of Kernel
3 = Depth 50% or less of Kernel

E. Color

[3] 1=White 2= Amber 3= Red
4= OTHER (Specify)

G. PHENOL REACTION *(see instructions)*:

[4] 1 = Ivory 2 = Fawn
3 = Light Brown 4 = Dark Brown
5 = Black

F. TEXTURE

[1] 1=Hard 2=Soft

14. DISEASE: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

[2] Stem Rust *(Puccinia graminis* f. sp. *tritici)* (race mixture)

[1] Leaf Rust *(Puccinia recondita* f. sp. *tritici)* (race mixture)

[1] Stripe Rust *(Puccinia striiformis)* (race mixture)

[0] Loose Smut *(Ustilago tritici)*

[0] Tan Spot *(Pyrenophora tritici-repentis)*

[0] Flag Smut *(Urocystis agropyri)*

[0] Halo Spot *(Selenophoma donacis)*

[0] Common Bunt *(Tilletia tritici* or *T. laevis)*

[0] *Septoria nodorum* (Glume Blotch)

[0] Dwarf Bunt *(Tilletia controversa)*

[0] *Septoria avenae* (Speckled Leaf Disease)

[0] Karnal Bunt *(Tilletia indica)*

[0] *Septoria tritici* (Speckled Leaf Blotch)

[0] Powdery Mildew *(Erysiphe graminis* f. sp. *tritici)*

[0] Scab (*Fusarium* spp.)

[0] "Snow Molds"

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14. Disease *(Continued)* (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED 20020206

[0]	"Black Point" (Kernel Smudge)	[0]	Common Root Rot *(Fusarium, Cochliobolus* and *Bipolaris* spp.*)*
[3]	Barley Yellow Dwarf Virus (BYDV)	[0]	Rhizoctonia Root Rot *(Rhizoctonia solani)*
[1]	Soilborne Mosaic Virus (SBMV)	[0]	Black Chaff *(Xanthomonas campestris* pv. *translucens)*
[0]	Wheat Yellow (Spindle Streak) Mosaic Virus	[0]	Bacterial Leaf Blight *(Pseudomonas syringae* pv. *syringae)*
[3]	Wheat Streak Mosaic Virus (WSMV)	[ ]	Other (SPECIFY)
[ ]	Other (SPECIFY)	[ ]	Other (SPECIFY)
[ ]	Other (SPECIFY)	[ ]	Other (SPECIFY)
[ ]	Other (SPECIFY)	[ ]	Other (SPECIFY)

15. INSECT: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE SPECIFY BIOTYPE (where needed)

[1]	Hessian Fly *(Mayetiola destructor)* (Great Plains Biotype)	[ ]	Other (SPECIFY)
[0]	Stem Sawfly *(Cephus* spp.)	[ ]	Other (SPECIFY)
[0]	Cereal Leaf Beetle *(Oulema melanopa)*	[ ]	Other (SPECIFY)
[1]	Russian Aphid *(Diuraphis noxia* (USA Biotype)	[ ]	Other (SPECIFY)
[2]	Greenbug *(Schizaphis graminum)* (Biotypes C, E)	[ ]	Other (SPECIFY)
[0]	Aphids	[ ]	Other (SPECIFY)

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS

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PVP Application
Above Hard Red Winter Wheat
Exhibit D – Additional Description of the Variety (optional)

The following additional descriptive information is presented:

1) Grain yield and test weight data from the Colorado Uniform Variety Performance Trial (UVPT) from the 1999-2000 growing season (**Table 1**), the 2000-2001 growing season (**Table 2**), and averaged over the 1999-2000 and 2000-2001 growing seasons (**Table 3**).

2) End-use quality characteristics of Above (**Table 4**).

Table 1. Grain yield and test weight for CO980894 and other winter wheat entries tested in Colorado Dryland Variety Performance Trials, 2000.

Entry	Akron	Burlington	Genoa	Julesburg	Lamar	Walsh	Cheyenne Wells	Average Yield	Average Test Wt.
	bu a^{-1}								lb bu^{-1}
Trego	45.7	36.0	62.9	30.2	33.2	39.6	46.3	42.0	59.7
CO980894	**39.2**	**48.4**	**57.1**	**36.8**	**23.1**	**40.0**	**47.4**	**41.7**	**57.0**
2137	43.0	38.0	61.4	31.5	26.7	41.0	46.0	41.1	56.1
CO980889	39.6	47.4	57.7	37.8	21.4	38.9	42.7	40.8	56.3
Lakin	36.0	39.9	60.1	35.5	26.2	38.6	48.3	40.6	57.2
Alliance	41.2	39.6	57.6	36.3	27.9	35.0	45.5	40.4	56.5
Yuma	38.1	36.4	63.3	34.8	26.8	40.2	42.6	40.3	56.8
TAM 110	37.7	47.3	58.6	36.3	22.3	35.1	44.8	40.3	56.7
Prairie Red	43.0	38.9	52.9	33.2	25.0	39.9	45.3	39.7	56.9
TAM 107	39.0	38.6	58.2	37.9	22.4	39.1	42.6	39.7	56.9
Enhancer	37.8	39.3	61.8	29.8	24.0	36.4	43.8	39.0	55.0
Stanton	34.5	36.5	61.8	28.6	28.4	34.6	48.4	39.0	58.0
Akron	38.8	29.8	67.8	28.3	24.8	34.4	43.9	38.3	57.0
Jagger	41.5	34.1	55.2	39.4	24.1	28.6	40.6	37.6	55.8
Halt	38.3	30.8	58.2	31.8	21.9	32.7	40.1	36.3	56.1
Yumar	35.1	32.9	56.2	31.2	24.6	32.1	40.8	36.1	57.2
Prowers 99	29.1	22.3	53.7	21.8	23.9	28.9	36.5	30.9	58.1
Wichita	26.1	26.3	41.7	27.5	19.9	26.6	36.4	29.2	58.3

Table 2. Grain yield and test weight for CO980894 and other winter wheat entries tested in Colorado Dryland Variety Performance Trials, 2001.

Entry	Akron	Burlington	Genoa	Julesburg	Lamar	Walsh	Briggsdale	Cheyenne Wells	Average Yield	Average Test Wt.
	bu a^{-1}								lb bu^{-1}	
Trego	56.5	37.9	42.3	48.0	47.7	50.7	56.4	42.6	47.8	58.2
Jagger	56.1	38.8	52.4	43.9	34.4	47.1	65.0	35.4	46.7	56.3
Stanton	54.8	43.2	43.2	43.5	47.4	42.5	60.8	34.9	46.3	56.2
Enhancer	60.7	36.3	47.6	48.7	41.3	36.8	52.5	40.4	45.5	55.9
Alliance	45.1	34.3	41.3	41.8	48.9	39.4	65.1	35.8	44.0	55.4
Akron	52.9	34.7	37.4	42.3	41.7	40.8	62.6	32.8	43.2	55.8
Yuma	54.0	41.7	36.0	44.1	40.3	36.2	56.3	36.1	43.1	55.5
Halt	49.6	35.8	39.0	40.1	42.3	34.1	63.2	39.0	42.9	55.7
CO980894	**45.3**	**35.2**	**35.6**	**46.5**	**41.3**	**40.4**	**56.1**	**35.2**	**41.9**	**54.9**
Prowers 99	42.5	35.4	34.0	35.8	47.5	48.9	51.7	35.6	41.4	58.2
Yumar	46.4	36.2	36.1	42.4	41.1	36.9	53.2	33.6	40.7	56.6
Prairie Red	47.0	36.7	32.8	39.0	40.0	36.3	57.1	36.6	40.7	55.8
TAM 107	45.2	35.8	30.2	37.3	40.6	33.8	56.2	42.3	40.2	56.0
CO980889	50.8	29.6	32.7	41.2	38.2	34.1	57.2	32.3	39.5	54.4
Lakin	37.4	35.5	28.1	37.8	43.8	34.0	54.6	34.3	38.2	56.5
TAM 110	41.6	38.2	33.0	42.6	29.8	28.1	57.6	32.5	37.9	54.4
2137	31.3	32.9	33.7	37.4	42.8	36.2	53.9	34.4	37.8	55.1
Wichita	34.5	30.6	30.4	26.3	36.1	36.9	45.4	33.4	34.2	58.1

Table 3. Grain yield and test weight for CO980894 and other winter wheat entries tested in Colorado Dryland Variety Performance Trials, 2000-2001.

ID (no. years)	Akron (n=2)	Burlington (n=2)	Genoa (n=2)	Julesburg (n=2)	Bennett (n=1)	Lamar (n=2)	Walsh (n=2)	ChWells (n=2)	Briggsdale (n=1)	Average (n=15)†	Test Wt. Avg. (n=15)
	bu a^{-1}										lb bu^{-1}
Trego	51.1	36.9	52.6	39.1	36.2	40.5	45.1	44.4	56.4	45.1	59.0
Enhancer	49.2	37.8	54.7	39.3	40.4	32.7	36.6	42.1	52.5	42.5	55.3
Jagger	48.8	36.5	53.8	41.7	26.6	29.3	37.9	38.0	65.0	42.4	56.1
Alliance	43.1	36.9	49.4	39.1	38.8	38.4	37.2	40.7	65.1	42.3	55.9
CO940611	44.4	38.1	50.8	37.0	27.2	34.7	42.4	41.4	52.8	42.0	58.2
CO980894	**42.2**	**41.8**	**46.4**	**41.7**	**26.1**	**32.2**	**40.2**	**41.3**	**56.1**	**41.8**	**56.0**
Yuma	46.1	39.0	49.6	39.4	30.1	33.6	38.2	39.3	56.3	41.8	56.0
Akron	45.8	32.2	52.6	35.3	47.0	33.2	37.6	38.4	62.6	40.9	56.3
Prairie Red	45.0	37.8	42.9	36.1	32.8	32.5	38.1	41.0	57.1	40.2	56.2
CO980889	45.2	38.5	45.2	39.5	25.1	29.8	36.5	37.5	57.2	40.1	55.3
TAM 107	42.1	37.2	44.2	37.6	24.0	31.5	36.4	42.5	56.2	39.9	56.4
Halt	43.9	33.3	48.6	35.9	29.6	32.1	33.4	39.6	63.2	39.8	55.7
2137	37.2	35.4	47.5	34.5	34.5	34.7	38.6	40.2	53.9	39.3	55.5
TAM 110	39.6	42.7	45.8	39.5	34.9	26.0	31.6	38.6	57.6	39.0	55.5
Yumar	40.7	34.5	46.2	36.8	36.2	32.9	34.5	37.2	53.1	38.6	56.8
Prowers 99	35.8	28.8	43.8	28.8	47.4	35.7	38.9	36.1	51.7	36.5	58.0
Wichita	30.3	28.5	36.0	26.9	26.5	28.0	31.8	34.9	45.4	31.9	58.3

† Multiple location average does not include Bennett (2000), which was strongly influenced by freeze damage of May 13, 2000.

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Table 4. Milling and breadmaking characteristics of CO980894, CO980889, TAM 110, TAM 107, and Prowers 99 across two composite quality evaluations in 1999 and 2000 (Colorado UVPT).

Trait (unit of measurement)	CO980894	CO980889	TAM 110	TAM 107	Prowers 99
Grain volume weight (kg m^{-3})	57.3	56.3	58.3	58.5	60.6
Percent large kernels (percent)[†]	43.1	39.1	59.8	56.3	51.3
Kernel weight (mg)	25.9	25.0	30.0	29.2	28.7
SKCS kernel hardness (score)[‡]	78.0	79.0	76.5	78.0	74.0
Flour ash (g kg^{-1})	4.6	4.8	4.4	4.4	4.6
Flour extraction (g kg^{-1})	633	620	668	654	645
Flour protein content (g kg^{-1})	140	138	118	122	125
Water absorption (g kg^{-1})	647	646	620	628	638
Bake mix time (min)	2.5	2.8	3.0	3.3	5.6
Mixograph tolerance (score)[§]	2.0	2.0	2.5	2.5	4.5
Loaf volume (L)	0.87	0.92	0.86	0.88	0.91
Crumb grain score (score)[¶]	1.5	2.0	1.5	1.8	4.0

[†] Percent kernels that do not pass through a Tyler #7 Sieve (2.92 mm openings).

[‡] Single kernel characterization system (SKCS) hardness index value.

§ Mixograph tolerance score: 6=outstanding, 0=unsatisfactory.

¶ Crumb grain score: 6=outstanding, 0=unsatisfactory.

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Colorado Wheat Research FND.	CO980894	Above

4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country)	5. TELEPHONE (Include area code)	6. FAX (Include area code)
Dept. Soil and Crop Sciences Colorado State University Fort Collins, CO 80523	970-491-6483	970-491-0564

7. PVPO NUMBER 20020206

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain** [X] YES [ ]

9. Is the applicant (individual or company) a U.S. National or a U.S. based company? **If no, give name of country** [X] YES [ ] NO

10. Is the applicant the original owner? [ ] YES [X] NO **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

[ ] YES [ ] NO **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

[X] YES [ ] NO **If no, give name of country**

11. Additional explanation on ownership *(If needed, use the reverse for extra space)*:

The cultivar for which Plant Variety Protection is hereby sought, was developed by a CSU team led by Dr. Scott Haley, and employee of Colorado State University (CSU). By agreement between Dr. Haley and CSU, all rights to all cultivars developed by him while employed by CSU were assigned to CSU. Ownership of the cultivar has been transferred from CSU to the Colorado Wheat Research Foundation, Inc., 7700 E. Arapahoe Road, Suite 220, Englewood, CO 80112.

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.